

What is the relationship between neighborhood and community food access in food retail settings and impact on individuals' dietary intake and quality? (2015 DGAC)

Conclusion

Emerging evidence suggests that the relationship between access to farmers' markets and produce stands and dietary intake and quality is favorable. The body of evidence regarding access to other food outlets, such as supermarkets, grocery stores, convenience and corner stores, and dietary intake and quality is limited and inconsistent.

Grade

Not assignable

Description of the Evidence

This systematic review includes 18 studies conducted in the United States, including 15 cross-sectional studies that accessed food access by distance to food outlets (Carroll-Scott, 2013; Caspi, 2012; Dean, 2011; Ding, 2012; Jago, 2007; Jilcott Pitts, 2013; Sharkey, 2010), density of food outlets (An, 2012; Gustafson, 2012a; Jack, 2013; Moore, 2008; Ollberding, 2012; Powell, 2009; Zenk, 2009) or both (Laska, 2010; Zenk, 2009). Some of these studies (Gustafson, 2012a; Powell, 2009; Sharkey, 2010) examined additional measures of food access, including the availability, affordability and quality of foods within various food outlets. One longitudinal study (Boone-Heinonen, 2011) examined the relationship between food availability and food and vegetable intake and overall diet quality among adults. Two controlled trials among low-income populations (Gittelsohn, 2010; Gustafson, 2012b) examined the relationship between food access and dietary intake and quality and the impact of an intervention modifying the food environment and a weight management program, respectively. Most of the included studies had relatively low risk of bias ratings (scores ranged from zero to eight points out of 26 or 28.) ([Click here for a summary](#)).

Sample size of these studies ranged from 116 to 15,634 participants; eight studies had 100 to 500 (Ding, 2012; Gittelsohn, 2012; Gustafson, 2012a; Gustafson, 2012b; Jago, 2007; Jilcott Pitts, 2013; Laska, 2010; Ollberding, 2012), three studies had 500 to 1,000 (Caspi, 2012; Sharkey, 2010; Zenk, 2009), five studies had 1,000 to 5,000

(Boone-Heinonen, 2011; Carroll-Scott, 2013; Dean, 2011; Moore, 2008; Powell, 2009) and two studies had more than 10,000 (An, 2012; Jack, 2013).

Population

Most studies examined food access and diet in a general population of adults (Boone-Heinonen, 2011; Caspi, 2012; Dean, 2011; Gustafson, 2012a; Jack, 2013; Moore, 2008; Ollberding, 2012; Powell, 2009; Zenk, 2009); two focused on women (Gustafson, 2012b; Jillcott Pitts, 2013); one study focused on adolescent boys (Jago, 2007) and another focused on seniors (Sharkey, 2010). Five studies focused solely on children and adolescents (An, 2012; Carroll-Scott, 2013; Ding, 2012; Jago, 2007; Laska, 2012); one study assessed the impact of a food environment intervention among children and their caregivers (Gittelsohn, 2012). Where reported, mean age of participants ranged from 8.3 years to 69.9 years, with one study including 6-year-olds to 90-year-olds and multiple studies with no specified upper cut-off for age.

Information related to socioeconomic status (SES) was reported in all studies, and indicators included neighborhood variables (per capita income), household demographics (household income, food assistance participation, percentage of federal poverty level) and individual characteristics (educational achievement, free or reduced lunch eligibility, income level, unemployment rate, type of employment and vehicle ownership). Race was reported in 17 studies with the racial profiles of the samples varying greatly (**refer to the [Overview Table](#) for study-specific details**).

Exposures

Food availability was measured in many ways for individuals, families and neighborhoods, including proximity to food outlets [total and by type (supercenters, supermarkets, large chain grocery stores, medium-sized grocery stores, small or specialty grocery stores, convenience stores, candy stores, bakeries, farmers' markets and produce stands)], density of food outlets (total and by type), distance to the outlet closest to a residential location, mean distance traveled to food outlets where participants reported shopping and foods available in stores.

Within each of these exposures, the measurement of food availability varied as well. Some studies objectively measured the availability of food outlets per capita or within a certain radius of a participant's home using geographic information systems. Others assessed perceived availability of healthy vs. unhealthy food outlets and healthy foods in a store or neighborhood. Foods available in stores also were determined by the Nutrition Environment Measures Survey or subjective assessment of the retail food environment (e.g., whether or not certain foods were available and the variety and quality of fruits and vegetables).

Food outlets were identified through various methods, including the U.S. Census Bureau; the Dun and Bradstreet commercial dataset of U.S. business records; city and county public health records; and InfoUSA, a business and consumer contact database. When the categorization of food outlets was described, Standard Industrial Classification (SIC) codes or the North American Industry Classification System codes, which replaced SIC codes in 1997, were used.

There were also numerous ways in which food affordability was measured, including self-reported amount of money spent on groceries per week, perceived affordability of foods at the store where a participant completed his or her primary shopping),

perceived in-store affordability of certain foods (e.g., fruits and vegetables, low-fat meat products, whole grains and low-fat dairy products) and various price indexes by foods or food groups.

The exposure variables for both food availability and affordability were assessed as continuous and categorical variables in the statistical analyses.

Outcomes

Dietary outcomes were measured by self-report surveys, screeners, food frequency questionnaires (FFQ), chart review and 24-hour recalls. Dietary intake was assessed by energy intake and intake of certain foods and food groups (fruits, vegetables, grains, dairy products, meat, juice and soda), nutrients (percentage of energy from fat) and frequency of eating certain foods. Diet quality was assessed by the Healthy Eating Index (HEI) (total and component scores), the Diet Quality Index and author-derived indices (**refer to the [Overview Table](#) for study-specific details**).

Evidence Synthesis

This body of evidence includes 18 studies with significant methodological differences (**refer to the [Overview Table](#) for study-specific details**). Geography (i.e., rural, urban, suburban) and demographics (i.e., ethnicity, income, age, gender) vary greatly as do as most findings.

Two studies, out of two studies assessing the relationship, found significant, favorable associations between access to farmers' markets and produce stands and dietary outcomes. Four studies showed favorable dietary outcomes and access to supermarkets; two studies showed unfavorable outcomes and three studies did not find a relationship between access to supermarkets and dietary outcomes. Three studies showed favorable outcomes related to diet with grocery stores; one study showed unfavorable outcomes and two studies did not find a relationship between access to grocery stores and dietary outcomes. Two studies showed favorable outcomes related to diet and access to convenience stores; two studies showed unfavorable outcomes and one study did not find a relationship between access to convenience stores and dietary outcomes.

Due to the variability of studies and paucity of data, making comparisons across studies and drawing conclusions were difficult. In summary, there were limited, but consistent, favorable associations between access to farmers' markets and produce stands and dietary intake, variety and quality. Furthermore, there were no consistent findings regarding favorable or unfavorable effects on dietary outcomes in relation to access to other food outlets.

[Overview Table: Summary of Primary Studies Examining the Relationship Between Food Access and Diet.](#)

Assessment of the Body of Evidence

- **Quality, Quantity and Risk of Bias:** Collectively, the evidence base includes several studies by independent investigators; however, there is limited evidence for each specific food outlet type (e.g., two studies evaluated farmer's markets,

while convenience stores and grocery stores were assessed in six studies each). Despite a low risk of bias for most studies [as assessed by the NEL Bias Assessment Tool (BAT)] and sufficient sample sizes (range: 116 to 15,634), most studies were of weaker design (i.e., cross-sectional).

- **Consistency:** The independent variables and findings across studies were inconsistent for all food outlet types, with the exception of farmers' markets; however, only two studies evaluated the relationship between these specific food outlets and dietary outcomes
- **Impact:** The magnitude of the effect as well as the clinical and public health significance cannot be determined due to insufficient research and the use of different measures and methodology.
- **Generalizability:** The findings included in the evidence portfolio are likely generalizable to the US population of interest. The range of studies addressed urban, rural, ethnic, racial and income diversity.
- **Limitations:** The methodological differences across individual studies are significant. In addition, the myriad retail outlets that sell food vary considerably. This variability and the paucity of data on which to compare studies made it difficult to draw conclusions.

Implications

For people to improve their diets and health, they need to have convenient access to nutritious, high-quality and affordable healthy foods in environments where they live, work, learn and play. Limited access to affordable and healthy food is a challenge, particularly for families living in rural areas and low-income communities. Innovative approaches to bring healthy food retail into communities have proliferated, especially in underserved neighborhoods. These include creating financing programs to incentivize grocery store development; improving availability of healthy foods and beverages at corner stores and bodegas, farmers markets and mobile markets, community gardens and youth-focused gardens; creating new forms of wholesale distribution through food hubs; and improving transportation and public safety options. However, most of these approaches lack adequate evaluation. These and other promising equity-oriented efforts need to continue and be evaluated and then successfully scaled up to other communities.

To ensure healthy food access to everyone in America, action is needed across all levels, including Federal, state and local, to create private-public partnerships and business models, with the highest priority on those places with greatest need. Similar efforts are needed to reduce access to and consumption of, calorie-dense nutrient poor foods and sugar-sweetened beverages in community settings. These efforts need to be seamlessly integrated with food assistance programs such as food banks, soup kitchens and Federal nutrition assistance programs such as Women, Infants and Children (WIC), Supplemental Nutrition Assistance Program (SNAP) and elder nutrition programs.

Research Recommendations

1. Develop better valid and reliable methods for measuring the total food environment of communities. These methods can then be used to assess the impact of the food environment on community health as well as economic

development and growth. **Rationale:** The food environment has become more complex with more and more retail outlets selling foods and beverages. Having valid and reliable methodologies (tools and new analytical approaches) will allow more meaningful inquiry into the contributions of various retail outlets in supporting or hindering nutritional health.

2. Identify, implement, evaluate and scale up best practices (including private-public partnerships) for affordable and sustainable solutions to improving the food environment and increasing food access, especially in those environments of greatest need. **Rationale:** The environments that people live, work, learn and play in greatly influence their food intake. In order to best guide efforts to improve the food environment, research will be needed to identify and evaluate best practices in order to direct available resources to scale up.
3. Identify, implement, accelerate and evaluate and scale up healthy food access programs that integrate seamlessly with Federal nutrition assistance programs such as SNAP, WIC as well as elder nutrition. **Rationale:** Federal nutrition assistance programs reach individuals and populations with the greatest health disparities. Identifying and evaluating initiatives that integrate improvements in the food environment with federal programs will help insure that our federal nutrition assistance programs are as impactful as possible.

References

1. An R, Sturm R. School and residential neighborhood food environment and diet among California youth. *Am J Prev Med*. 2012;42(2):129-35. PMID: 22261208. <http://www.ncbi.nlm.nih.gov/pubmed/22261208>
2. Boone-Heinonen J, Gordon-Larsen P, Kiefe CI, Shikany JM, Lewis CE, Popkin BM. Fast food restaurants and food stores: longitudinal associations with diet in young to middle-aged adults: the CARDIA study. *Arch Intern Med*. 2011;171(13):1162-70. PMID: 21747011. <http://www.ncbi.nlm.nih.gov/pubmed/21747011>
3. Carroll-Scott A, Gilstad-Hayden K, Rosenthal L, Peters SM, McCaslin C, Joyce R, et al. Disentangling neighborhood contextual associations with child body mass index, diet, and physical activity: the role of built, socioeconomic, and social environments. *Soc Sci Med*. 2013;95:106-14. PMID: 23642646. <http://www.ncbi.nlm.nih.gov/pubmed/23642646>
4. Caspi CE, Kawachi I, Subramanian SV, Adamkiewicz G, Sorensen G. The relationship between diet and perceived and objective access to supermarkets among low-income housing residents. *Soc Sci Med*. 2012;75:1254-62. PMID: 22727742. <http://www.ncbi.nlm.nih.gov/pubmed/22727742>
5. Dean WR, Sharkey JR. Rural and urban differences in the associations between characteristics of the community food environment and fruit and vegetable intake. *J Nutr Educ Behav*. 2011;43(6):426-33. PMID: 21616721. <http://www.ncbi.nlm.nih.gov/pubmed/21616721>
6. Ding D, Sallis JF, Norman GJ, Saelens BE, Harris SK, Kerr J, et al. Community food environment, home food environment, and fruit and vegetable intake of children and adolescents. *J Nutr Educ Behav*. 2012;44(6):634-8. PMID: 21531177. <http://www.ncbi.nlm.nih.gov/pubmed/21531177>
7. Gittelsohn J, Vijayadeva V, Davison N, Ramirez V, Cheung LW, Murphy S, et al. A food store intervention trial improves caregiver psychosocial factors and

- children's dietary intake in Hawaii. Obesity (Silver Spring). 2010;18 Suppl 1:S84-90. PMID: 20107467. <http://www.ncbi.nlm.nih.gov/pubmed/20107467>
8. Gustafson A, Lewis S, Perkins S, Wilson C, Buckner E, Vail A. Neighbourhood and consumer food environment is associated with dietary intake among Supplemental Nutrition Assistance Program (SNAP) participants in Fayette County, Kentucky. Public Health Nutr. 2013;16(7):1229-37. PMID: 23462377. <http://www.ncbi.nlm.nih.gov/pubmed/23462377>
 9. Gustafson AA, Sharkey J, Samuel-Hodge CD, Jones-Smith JC, Cai J, Ammerman AS. Food Store Environment Modifies Intervention Effect on Fruit and Vegetable Intake among Low-Income Women in North Carolina. J Nutr Metab. 2012;2012:932653. PMID: 22315676. <http://www.ncbi.nlm.nih.gov/pubmed/22315676>
 10. Jack D, Neckerman K, Schwartz-Soicher O, Lovasi GS, Quinn J, Richards C, et al. Socio-economic status, neighbourhood food environments and consumption of fruits and vegetables in New York City. Public Health Nutr. 2013;16:1197-205. PMID: 23388104. <http://www.ncbi.nlm.nih.gov/pubmed/23388104>
 11. Jago R, Baranowski T, Baranowski JC, Cullen KW, Thompson D. Distance to food stores & adolescent male fruit and vegetable consumption: mediation effects. Int J Behav Nutr Phys Act. 2007;4:35. PMID: 17850673. <http://www.ncbi.nlm.nih.gov/pubmed/17850673>
 12. Jilcott Pitts SB, Wu Q, McGuirt JT, Crawford TW, Keyserling TC, Ammerman AS. Associations between access to farmers' markets and supermarkets, shopping patterns, fruit and vegetable consumption and health indicators among women of reproductive age in eastern North Carolina, U.S.A. Public Health Nutr. 2013;16(11):1944-52. PMID: 23701901. <http://www.ncbi.nlm.nih.gov/pubmed/23701901>
 13. Laska MN, Hearst MO, Forsyth A, Pasch KE, Lytle L. Neighbourhood food environments: are they associated with adolescent dietary intake, food purchases and weight status? Public Health Nutr. 2010;13(11):1757-63. PMID: 20529405. <http://www.ncbi.nlm.nih.gov/pubmed/20529405>
 14. Moore LV, Diez Roux AV, Nettleton JA, Jacobs DR, Jr. Associations of the local food environment with diet quality—a comparison of assessments based on surveys and geographic information systems: the multi-ethnic study of atherosclerosis. Am J Epidemiol. 2008;167(8):917-24. PMID: 18304960. <http://www.ncbi.nlm.nih.gov/pubmed/18304960>
 15. Oilberding NJ, Nigg CR, Geller KS, Horwath CC, Motl RW, Dishman RK. Food outlet accessibility and fruit and vegetable consumption. Am J Health Promot. 2012;26(6):366-70. PMID: 22747319. <http://www.ncbi.nlm.nih.gov/pubmed/22747319>
 16. Powell LM, Zhao Z, Wang Y. Food prices and fruit and vegetable consumption among young American adults. Health Place. 2009;15(4):1064-70. PMID: 19523869. <http://www.ncbi.nlm.nih.gov/pubmed/19523869>
 17. Sharkey JR, Johnson CM, Dean WR. Food access and perceptions of the community and household food environment as correlates of fruit and vegetable intake among rural seniors. BMC Geriatr. 2010;10:32. PMID: 20525208. <http://www.ncbi.nlm.nih.gov/pubmed/20525208>
 18. Zenk SN, Lachance LL, Schulz AJ, Mentz G, Kannan S, Ridella W. Neighborhood retail food environment and fruit and vegetable intake in a multiethnic urban population. Am J Health Promot. 2009;23(4):255-64. PMID: 19288847. <http://www.ncbi.nlm.nih.gov/pubmed/19288847>

NEL Bias Assessment Rating Summary

For a summary of the NEL Bias Assessment Rating results, [click here](#).